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Mesotherapy - technique for gingival depigmentation

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Abstract

The unique tissue that envelops and maintains the teeth is called periodontium. The alveolar bone proper, cementum, gingiva, and Periodontal Ligament (PDL) are its constituent parts. The gingival line, which covers the coronal portion of the alveolar process and indicates the boundary with the non-keratinized buccal mucosa, extends from the gingiva line, which is the exterior surface of the periodontium.

The most often pigmented intraoral tissue is the connected gingiva, which is followed by papillary gingiva and alveolar mucosa. Gingival hyperpigmentation is regarded as one of the primary cosmetic issues in dentistry.

Mesotherapy is a technique commonly applied to introduce various agents to treat oral pigmentation.

The use of vitamin C, also known as ascorbic acid, is common in dermatology to treat skin depigmentation because it inhibits tyrosine activity, which in turn decreases the production of dopaquinone. Antioxidant and anti-inflammatory qualities of vitamin C improve tissue healing and decrease melanin while also aiding in the manufacture of type 1 collagen.

Oral mesotherapy, or intramucosal vitamin C injections, is a preliminary case series intended to demonstrate the clinical efficacy and patient-reported results of treating gingival melanin hyperpigmentation.

Aim: To assess the effectiveness of mesotherapy, or intramucosal injection, in treating gingival hyperpigmentation in smokers and non-smokers

Methodology: Twenty patients with chronic gingivitis-ten smokers and ten non-smokers-were split into groups 1 and 2, respectively, for this study. Every patient received intramuscular local injection of vitamin C in the maxillary and mandibular front region once a week for three to four visits.

The Gingival Pigmentation Index, developed by Kumar *et al.* in 2013, will be used to assess the depigmentation.

Result: The present study recorded Gingival Pigmentation Index and taken clinical photographs at baseline and at 3 months, which were significantly improved in smokers compared to non-smokers

Conclusion: Gingival depigmentation can be effectively treated with oral mesotherapy, a minimally invasive, safe, and aesthetically pleasing method that uses locally injected vitamin C.

Keywords: Gingivitis, gingival depigmentation, mesotherapy, vitamin c, smoker, index

Introduction

The gingiva is essential to the masticatory process as well as the general anatomical and cosmetic characteristics of a person's mouth. The thickness of the epithelium, the level of keratinization, the existence and quantity of melanin deposition, and the underlying connective tissue are some of the elements that affect gum color. The color of the gum is also influenced by other pigments found in the bloodstream, such as oxyhemoglobin or hemoglobin^[1].

Gingival hyperpigmentation is becoming more and more in need of cosmetic adjustments, particularly when it affects the anterior labial gingiva, and is linked to increased gingival show when smiling^[2]. Active melanocytes are responsible for the excessive physiological deposition of melanin, which is observed in the basal layer of the epithelium^[3]. Through dendritic projections, the melanocytes release melanin granules into neighboring keratinocytes^[4]. The natural pigment melanin gives the skin, hair, eyes, and mucous membranes their color. It might be reddish (pheomelanin) or brown or black (eumelanin), depending on the kind. Many reasons, including drug use, heavy metal exposure, heredity, endocrine problems, UV radiation exposure, inflammation, benign or malignant growths, purposeful tattooing, and smoking, can result in melanin hyperpigmentation^[5, 6].

It is crucial to obtain a complete medical history from the patient and do a comprehensive histological investigation in order to ascertain whether the reason is pathological or physiological [7, 8].

Additionally, smoking might lead to an excessive build-up of melanin in the oral epithelial layer. Nicotine and the benzopyrenes found in tobacco are examples of polycyclic amines that can stimulate the production of melanin by the melanocytes [9]. Smoker's melanosis, also known as tobacco-associated melanin pigmentation, is dose-dependent and has been documented in 22% of smokers. The disease typically manifests as a diffuse, black-brown macule that primarily affects the gingiva, followed by the buccal mucosa, lip, and hard palate. Women are more likely to be affected than men [10]. Clinical characteristics and smoking history are used to make the diagnosis [11].

The term "smoker's melanosis" was first used in 1977 by Hedin *et al.* to characterize a safe, localized increase in melanin pigmentation that appears in tobacco smokers' connected gingiva [12]. Tobacco contains polycyclic amines that activate melanocytes, which create melanin [13]. Unless they are for cosmetic purposes, these variations in pigmentation are thought to be normal and normally don't require therapy. It has been demonstrated that pigmentation can be successfully removed by quitting smoking [13, 14].

In order to remove the hyperpigmented gingival tissues, a variety of subtractive treatment techniques have been introduced as part of periodontal surgery. These techniques include conventional methods like gingival abrasion, excision/scalpel or stripping surgical technique, as well as advanced methods like electrosurgery, lasers, cryosurgery, and radiosurgery, in addition to additive masking techniques like free gingival grafting or acellular dermal matrix allograft (ADMA).

The clinical assessment and the patient's preferences are taken into consideration while choosing a technique [15-20]. Numerous studies examined gingival depigmentation treatments in order to determine the most dependable, comfortable, and successful approaches.

Despite being the most popular method of treating gingival hyperpigmentation, surgical techniques are associated with significant postoperative wounds, pain, bleeding, fear, and recurrence [21].

The ideal condition for executing the surgical method is said to be thick gingival biotype. To lower the recurrence rate, the gingival tissues must be sufficiently removed in thickness. Even in dense gingival biotypes, the marginal and interdental papillary tissues continue to be important areas. Typically, the biotype of these areas differs from the biotype of the remaining gingival tissues.

The papilla sparing technique-staying 1-2 mm away from the gingival border and interdental papilla-is advised in cases with thin gingival biotype. It is therefore not advised to undergo papillary depigmentation when there is interproximal bone loss. Thankfully, there isn't much pigmentation in these areas, which might be because of the thin epithelial layer that causes little stimulation of pigment cells. Surgical depigmentation is not strongly advised in cases with deeply localized pigmentation and thin gingival biotype. Following treatment, periodontal dressing should be worn for seven to ten days. Healing happens by accident. Surgical depigmentation is still regarded as one of the most straightforward periodontal surgical procedures since it takes less time, energy, and equipment. (Bhusari & Kasat, 2011 and Hegde *et al.*, 2013) [22-25].

Furthermore, the recurrence may depend on melanocyte activity as well as disturbances in the basement membrane [26]. Regarding skin depigmentation, ascorbic acid/vitamin C has demonstrated encouraging outcomes. Due to its epigenetic inhibitory effect on genes responsible for melanocyte function and its suppressing effect on tyrosine activity, which directly downregulates dopaquinone formation, a precursor in melanin synthesis, it has been introduced topically, trans dermally, or intravenously. It has also been used as a treatment for melanin pigmentation [27-28].

The antioxidant capacity of vitamin C affects how depigmenting it can be. Reactive oxygen species (ROS), copper, and calcium are stored in melanin, which reduces the amount of melanin produced. Lack of calcium also prevents melanocytes from adhering cellularly to keratinocytes, which is necessary for the synthesis of melanin [29, 30].

Mesotherapy is a minimally invasive technique that uses fine-gauge needles to locally administer modest amounts of medication to the mesoderm layer to cure medical conditions or achieve cosmetic goals. The development of the skin, connective tissue, muscles, tendons, and circulatory system occurs in the mesoderm, one of the embryo's main germ layers. It is primarily in charge of the vitality and health of the skin [31]. The mesotherapy injection technique is mostly based on the target tissues' geometrical, histological, and anatomical landmarks. The Father of Mesotherapy, Pistor, first described the method in 1952. After a few hours, he gave a partially deaf patient an injection of procaine in the superficial dermal layer surrounding their ear, and the results were encouraging [32]. Yussis *et al.* changed the original mesotherapy used in dermatology to oral mesotherapy (intra-epidermal) [33].

Using tiny needles, the chemical is injected into the superficial layers of the oral tissue that stretch between the foundation membrane and the superficial connective tissue.

Different pharmaceutical substances penetrate the skin and oral mucosa differently. Hydrophobic substances have better oral tissue absorption than skin. Furthermore, as the oral mucosa is moist, the oral mesotherapy technique should be performed first to induce surface dryness with gauze [32].

This article's goal was to demonstrate the intra-epidermal (oral mesotherapy) vitamin C injection's clinical efficacy for the non-surgical treatment of gingival melanin hyperpigmentation that occurs naturally.

Therefore, whether used topically or trans dermally, vitamin C has been frequently employed in dermatology as a minimally invasive and generally safe depigmenting method.

Additionally, investigations conducted *in vivo* showed that it had an impact on the function and quantitative productivity of melanocytes as well as a dose-dependent reduction in the melanocytes' and keratinocytes' cell-to-cell contact.

Vitamin C may be the only treatment for melanin gingival hyperpigmentation, as supported by several case studies that show depigmentation or a delay in gingiva re-pigmentation after local ascorbic acid application as an adjuvant to surgical depigmentation procedures.

Materials and Methods

Aim

The aim of this study is to compare the efficacy of intra-mucosal injection (mesotherapy) in smokers and non-smokers for managing gingival hyperpigmentation.

Study population

20 gingival hyperpigmented patients were selected from the outpatient section, Department of Periodontics, College of

Dental Sciences, Davangere, Karnataka and was divided into 2 groups.

- Group 1-10 smokers with gingival hyperpigmentation.
- Group 2-10 non-smokers with gingival hyperpigmentation

Injectable vitamin C was given topically to each patient three to four visits per week in the mandibular and maxillary regions.

Patients who did not have a systemic disease and practiced good dental hygiene met the inclusion criteria.

Patients with pathological conditions, those taking vitamin C supplements for any other purpose, those with systemically weakened immune systems, those with drug-induced gingival hyperpigmentation, and those with known allergies to ascorbic acid or its derivatives were not allowed to participate.

Each participant received information regarding the process and results of oral mesotherapy and surgical treatments for gingival depigmentation. All the patients included in the study were asked to sign a written consent.

Treatment protocol

For every patient included, full-mouth scaling was done using hand and ultrasonic tools, and a single operator handled the injection process. Initially, all patients received infiltration to anesthetize the pigmented area. On the following visit, local

infiltration was used in accordance with the patient's feeling of pain. Next, a 1.5 to 2.0 ml (250 mg concentration) intra-epidermal gingival injection (oral mesotherapy technique) of L-ascorbic acid (V-C injection, 2 ml ampule containing 500 mg ascorbic acid, Vesco pharmaceutical) was given. For this treatment, an insulin-administering syringe (30 gauge) was utilized (Figure 1, 2). The needle was inserted at 0.5 to 2.0 mm depth to ensure drug delivery was intra-epidermal and not deeper. Therefore, the needle's shadow should be visible beneath the tissue before shooting. If the needle was not visible, it was taken out and redirected. About 0.1ml of vitamin C was locally administered till the gingival blanches for each 2 to 3 apart (Figure 3). The maxillary and mandibular esthetic zones' whole pigmented gingival region was covered after this procedure. The same process was carried out four times a week. Following the surgery, patients were advised not to eat anything spicy, acidic, or colourful. The injected area needed to be kept clean for at least three days before brushing again, and then an incredibly soft toothbrush was employed. If the discomfort doesn't go away, you could try using analgesics.

All the patients were administered injectable vitamin C locally [once per week for 3 to 4 visits] in the maxillary and mandibular anterior region and divided into group 1 and group 2. The depigmentation was assessed by using the Gingival Pigmentation Index by Kumar *et al.* in 2013^[34].



Fig 1: Armamentarium



Fig 2: Vitamin C vial and syringe



Fig 3: Delivering vitamin C solution

Assessment

The degree of gingival pigmentation was clinically assessed at baseline and at one- and three-month follow-ups following the completion of injection visits. The pigmentation index described below was noted by a lone examiner:

(Kumar *et al.*, 2013)^[34]

Score 0: Absent

Score 1: Spots of brown to black

Score 2: Brown to black patches but not diffuse

Score 3: Diffuse brown to black pigmentation.

The color assessment was evaluated in the day light and by examining the regular digital photographs which were taken pre-operative, 1 month and 3 month post-operatively.

Results

The present study recorded Gingival Pigmentation Index and taken clinical photographs at baseline and at 3 month, which were significantly improved in smokers compared to non-smokers.



Fig 4: preoperative in smokers



Fig 5: Post operative in smokers



Fig 6: Preoperative in non-smokers



Fig 7: Postoperative in non -smokers

Statistical analysis

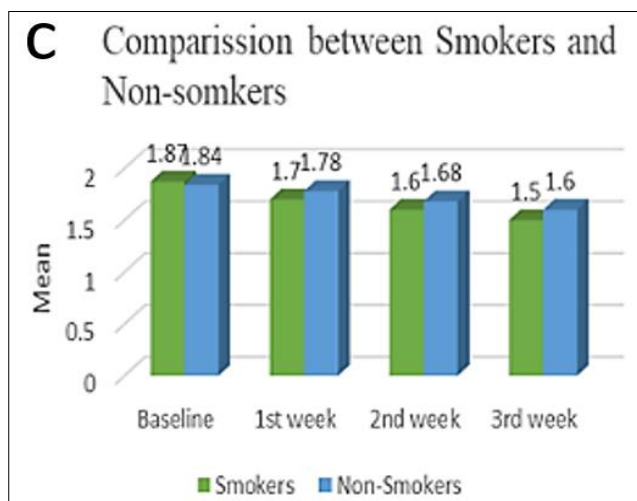
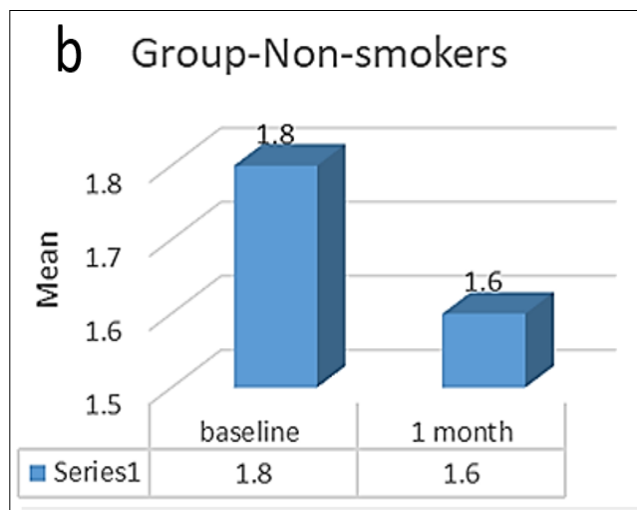
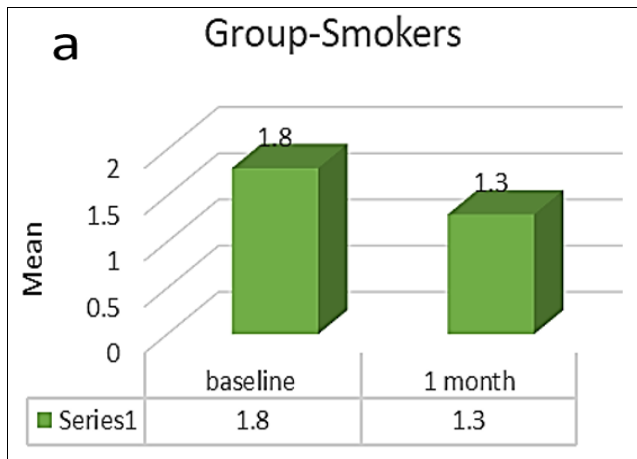


Fig 8: Graphs representing patient-reported outcomes in (a) smokers (b) non-smokers (c) comparison between smokers and non-smokers

Discussion

Today's dental care paradigm is centered around minimally invasive procedures. A relatively recent area of dentistry is oral mesotherapy, which aims to minimize surgical procedures for either therapeutic or aesthetic reasons. With the benefit of avoiding side effects brought on by drug metabolism, it seeks to offer a direct medication action on oral tissues. Vitamin C has demonstrated promising outcomes as a depigmenting agent in earlier clinical investigations. In a clinical study, Shimada *et al.* [35] found that a gel containing ascorbic acid could potentially employed for the treatment of gingival melanin depigmentation. In a case report, Sheel *et al.* [36] employed topical vitamin C as an adjunct to surgical depigmentation and found that there was no re-pigmentation after nine months. Vitamin C can be directly delivered to the pigmented gingival site by using the intra-epithelial injection approach, as proven by Yussif *et al.* [37] in their two clinical investigations. The gingival color findings were compared to the gold standard surgical scalpel procedure, as published by the authors.

For gingival depigmentation, a recent clinical trial by Motfy *et al.*, [38] found that the locally injected vitamin C was superior to the topical formulation. Here, vitamin C was added by the intra-epidermal method at the basement membrane's (about 0.5mm) level.

This degree of injection brings the vitamin next to the melanocyte-containing target layer and prolongs the storage of the injected substance. As a result, the medication can be released continuously and slowly into the surrounding tissues. The drug's effectiveness declines with deeper infusion as its clearance quickens. After depigmentation with vitamin C, gingival tissues take longer to rebuild, and a better color is noticeable one month after the injection is stopped. Consequently, baseline, one-month, and three-month clinical and digital parameters were recorded once the injection was finished.

After a month, parameters showed a considerable improvement above the baseline. Tissues darkened immediately following injection; this can be explained by vitamin C's affinity for melanin, which changes cellular junctions and compels cells to release their melanin. At a one-month follow-up, all instances had gradually lost their brownish-blackish pigmentation and had improved to a pinkish hue.

Patients' overall levels of satisfaction with the course of treatment varied from satisfied to very satisfied. Patients stated that they were driven to finish all therapy visits by the psychological comfort of a nonsurgical method that involved shorter appointments, less pain, less bleeding, and no interference with their regular activities like eating or speaking. Apart from its depigmenting properties, vitamin C also enhances the creation of collagen, promotes tissue repair, angiogenesis, and has anti-inflammatory properties for gingiva. Following vitamin C injections, Yussif *et al.*, [37] reported a statistically significant shift in the gingival biotype

from thin to thick.

Conclusion

The result of this study's findings demonstrates that the oral mesotherapy approach, which uses locally injected vitamin C, is a successful, safe, non-invasive, and aesthetically pleasing method of gingival depigmentation. These results need to be confirmed by larger sample sizes and longer follow-up investigations.

Conflict of Interest

Not available

Financial Support

Not available

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